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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/677,085	09/29/2000	Hye-Jeong Kim	678-529 (P9530)	2155

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EXAMINER	
KADING, JOSHUA A	
ART UNIT	PAPER NUMBER
2661	4

DATE MAILED: 02/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/677,085	KIM ET AL.	
	Examiner	Art Unit	
	Joshua Kading	2661	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 5-14* is/are rejected.

7)☒ Claim(s) *3,4,6,8 and 10* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 September 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

Figures 1, 2, and 3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

Claims 3, 6, 8, and 10 are objected to because of the following informalities:

Claim 3, lines 9-10; claim 6, lines 9-10; and claim 10, line 10 state, "the number of transitions". They should read, --a number of transitions--.

Claim 8, line 6 states, "the detected phase". It should be changed to --a detected phase--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 11-12 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which

was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 11, lines 2-3 state, "compensating...the timing error by converting the count value to a phase difference line..." How is the count value converted to compensate the timing error? The specification discloses the use of the count value as a deciding factor in compensating the timing error, but does not disclose the count value actually being manipulated into a phase difference line to compensate the timing error.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 3, 5, 6, 8, and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by applicant's admitted prior art.

In regard to claim 1, applicant's admitted prior art discloses "a timing error compensation system in an OFDM/CDMA (Orthogonal Frequency Division Multiplexing/Code Division Multiple Access) communication system, comprising:

a pilot symbol inserter for receiving a spread data symbol stream, and periodically inserting N pilot symbols each having a same phase using a specific period

in a symbol unit to compensate a timing error of a receiver (figure 1, element 101; specification, page 2, lines 12-18)."

In regard to claim 2, applicant's admitted prior art discloses "a timing error compensation system in an OFDM/CDMA communication system said OFDM/CDMA communication system including an analog-to-digital converter which converts an OFDM signal to a digital OFDM symbol stream using sampling synchronization; a data symbol stream received from a transmitter, in which a pilot symbol is inserted at intervals of a predetermined number of data symbols; a guard interval remover for removing a guard interval inserted in the OFDM symbol using frame synchronization; and a fast Fourier transform (FFT) device for performing fast Fourier transform on the guard interval-removed OFDM symbol and outputting a data symbol stream; said timing error compensation system comprising:

a pilot symbol detector which receives the data symbol stream and detecting the pilot symbols inserted in the data symbol stream at predetermined intervals in a symbol unit (figure 1, element 116; specification, page 3, lines 22-25); and

a timing compensator which determines a linear phase difference line for the detected pilot symbol using the pilot symbol and a reference symbol previously known by the receiver, generates a timing error estimation signal according to the determined linear phase difference line, and provides the timing error estimation signal to the analog-to-digital converter and the guard interval remover so as to determine the

sampling synchronization and the frame synchronization (figure 1, element 117; specification, page 3, lines 25-27 and page 4, lines 1-14)."

In regard to claim 3, applicant's admitted prior art discloses "the timing error compensation system as claimed in claim 2, wherein the timing compensator comprises:

a phase detector to detect a phase of the pilot symbol in a sample data unit (figure 1, element 116; specification, page 4, lines 11-13);

a phase difference detector to detect a phase difference between the detected phase of the pilot sample and a reference phase and converting the detected phase difference to a value within a specific range (page 4, lines 10-15 where the phase difference detector is part of element 117);

a phase fluctuation estimator to determine a phase difference line by accumulating the phase difference in a symbol unit, and counting [a] number of transitions in the phase difference line (page 4, lines 10-15 where the phase fluctuation estimator is part of element 117); and

a timing error compensation signal generator to generate a timing error estimation signal to compensate for a timing error according to the count value of the transition number (figure 1, element 117; specification, page 3, lines 25-27 and page 4, lines 1-14)."

In regard to claim 5, applicant's admitted prior art discloses "a timing error compensation system in an OFDM/CDMA communication system, which receives an OFDM signal, said OFDM/CDMA communication system comprised of a data symbol stream received from a transmitter, in which a pilot symbol is inserted at periods of a prescribed number of data symbols and outputting a data symbol stream through a fast Fourier transform, said timing error compensation system comprising:

a pilot symbol detector to detect a pilot symbol inserted in the data symbol stream at prescribed intervals (figure 1, element 116; specification, page 3, lines 22-25);

a timing compensator to determine a linear phase difference line for the detected pilot symbol, and generate a timing error estimation signal according to the determined linear phase difference line (figure 1, element 117; specification, page 3, lines 25-27 and page 4, lines 1-14);

an analog-to-digital converter to determine sampling synchronization according to the timing error estimation signal from the timing compensator, and converting the OFDM signal to a digital OFDM symbol by the determined sampling synchronization (figure, element 111; specification, page 3, lines 9-12, 26-27 and page 4, line 1);

and a guard interval remover to determine frame synchronization according to the timing error signal from the timing compensator, and to remove a guard interval inserted in the OFDM symbol from the analog-to-digital converter (figure 1, element 112; specification, page 3, lines 12-14, 26-27 and page 4, lines 1-2)."

In regard to claim 6, applicant's admitted prior art discloses "the timing error compensation system as claimed in claim 2, wherein the timing compensator comprises:

a phase detector to detect a phase of the pilot symbol in a sample data unit (figure 1, element 116; specification, page 4, lines 11-13);

a phase difference detector to detect a phase difference between the detected phase of the pilot sample and a reference phase and converting the detected phase difference to a value within a specific range (page 4, lines 10-15 where the phase difference detector is part of element 117);

a phase fluctuation estimator to determine a phase difference line by accumulating the phase difference in a symbol unit, and counting [a] number of transitions in the phase difference line (page 4, lines 10-15 where the phase fluctuation estimator is part of element 117); and

a timing error compensation signal generator to generate a timing error estimation signal to compensate for a timing error according to the count value of the transition number (figure 1, element 117; specification, page 3, lines 25-27 and page 4, lines 1-14)."

In regard to claim 8, applicant's admitted prior art discloses "a method for compensating a timing error in an OFDM system, which inserts a pilot symbol in a data symbol stream in a symbol unit at intervals of a predetermined number of data symbols, the method comprising the steps of:

detecting a pilot symbol inserted in a received data symbol stream at predetermined intervals (page 3, lines 22-25);

calculating a phase difference between the detected phase of the pilot symbol and a reference phase, and converting the calculated phase to a phase difference value within a specific range (page 4, lines 11-14); and

compensating a timing error using a transition number of the converted phase difference value (page 4, lines 11-14)."

In regard to claim 9, applicant's admitted prior art discloses "the method as claimed in claim 8, wherein the phase difference range is $\pm\pi$ (page 5, lines 21-22)."

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 7, 10, and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art in view of van Driest (U.S. Patent 6,314,145 B1).

In regard to claim 7, applicant's admitted prior art discloses "the timing error compensation system as claimed in claim 6". However, applicant's admitted prior art

lacks "a timing error estimation signal for compensating a timing error within a sample period is generated when the transition number count value is less than 1, and a timing error estimation signal for compensating a timing error over the sample period is generated when the transition number count value is greater than 1." van Driest however, discloses "a timing error estimation signal for compensating a timing error within a sample period is generated when the transition number count value is less than 1, and a timing error estimation signal for compensating a timing error over the sample period is generated when the transition number count value is greater than 1 (col. 7, lines 27-36 and 53-63 where the zero crossings are the transitions (as is the same in figure 3 of applicant's drawings); although van Driest doesn't specifically disclose the threshold value to be 1, he does disclose a threshold value and the choice of this threshold value is an arbitrary one dependent on design parameters and therefore a matter of design choice)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the threshold value with the system of claim 6 for the purpose of synchronizing the incoming data with the receiver clock. The motivation being proper and accurate signal reconstruction.

In regard to claim 10, applicant's admitted prior art discloses "a method for compensating a timing error in an OFDM system, which inserts a pilot symbol in a data symbol stream in a symbol unit at intervals of a predetermined number of data symbols, the method comprising the steps of: detecting a pilot symbol inserted in a received data symbol stream at predetermined intervals (page 3, lines 22-25); detecting a phase of

the detected pilot symbol in a sample data unit (page 4, lines 11-14); calculating a phase difference between the detected phase of the pilot symbol and a reference phase, and converting the calculated phase to a phase difference value within a specific range (page 4, lines 11-14)..."

However, applicant's admitted prior art lacks "...counting the number of transitions within a specific range for the respective data samples; determining whether the count value is larger than a prescribed value; and compensating a timing error, when the count value is larger than the prescribed value." van Driest however, discloses "...counting the number of transitions within a specific range for the respective data samples (col. 7, lines 27-36 and 53-63 where the zero crossings are the transitions (as is the same in figure 3 of applicant's drawings));

determining whether the count value is larger than a prescribed value; and compensating a timing error, when the count value is larger than the prescribed value (col. 7, lines 27-36 and 53-63 where the zero crossings are the transitions (as is the same in figure 3 of applicant's drawings); although van Driest doesn't specifically disclose the threshold value to be 1, he does disclose a threshold value and the choice of this threshold value is an arbitrary one dependent on design parameters and therefore a matter of design choice)."

It would have been obvious to one with ordinary skill in the art at the time of invention to include the count of transitions and the threshold with the rest of the method for the purpose of synchronizing the incoming data with the receiver clock. The motivation being proper and accurate signal reconstruction.

In regard to claim 13, applicant's admitted prior art and van Driest disclose the method of claim 10. However, applicant's admitted prior art and van Driest lack "the prescribed value is '1'". Although applicant's admitted prior art and van Driest lack "the prescribed value is '1'", van Driest does disclose a threshold value (col. 7, lines 53-63) and the choice of the prescribed value is an arbitrary one dependent on design parameters and therefore a matter of design choice. It would have been obvious to one with ordinary skill in the art at the time of invention to include the prescribed value being equal to '1' with the method of claim 10 for the same reasons and motivation as in claim 10.

In regard to claim 14, applicant's admitted prior art and van Driest disclose the method of claim 10. However, van Driest lacks "the phase difference range is $\pm\pi$." However, applicant's admitted prior art further discloses, "the phase difference range is $\pm\pi$ (page 5, lines 21-22)."

Allowable Subject Matter

Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joshua Kading whose telephone number is (703) 305-0342. The examiner can normally be reached on M-F: 8:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglas Olms can be reached on (703) 305-4703. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Joshua Kading
Examiner
Art Unit 2661

JK
February 12, 2004

KENNETH VANDERPUYE
PRIMARY EXAMINER